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Kansas Entomological Society

Volume 19 April, 1946 Number 2

THE FIFTEENTH OR 1945 ANNUAL INSECT POPULATION SUMMARY OF KANSAS[1]

ROGER C. SMITH,[2] GEO. A. DEAN,[2] and E. G. KELLY[3]
Kansas Agricultural Experiment Station

The insect population summary for Kansas covers the calendar year 1945 and is the fifteenth in a continuous series which began with the year 1931.[4] The information recorded here is based on a summary of 275 questionnaires of the score card type from the sources indicated in Table I together with the observations and comments of the authors, their colleagues and of those returning the score sheets.

Table I. Source and Numbers of Questionnaires Summarized for This Report

	No. in July	No. in October
Group 1. Entomologists in the state	10	11
Group 2. County Agriculture Agents	60	55
Group 3. Farmers, mostly college graduates	3	14
Group 4. Vocational Agricultural Teachers	45	50
Group 5. Agronomists and Horticulturists	12	15
Total reports of each group	130	145
Grand total of all questionnaires summarized for this report	275	

Summary of Weather Conditions (Fig. I and Table II) in Kansas by Months During 1945[5]

January had no unusually high or low temperatures, but there was less sunshine than usual. Excessive damp weather for the month, with heavy snows in the western part of the State, was very favorable for the wheat crop.

February weather was comparatively mild with excessive cloudiness. There were frequent falls of moisture and heavy snow over many areas. It was a favorable month for the wheat crop over Kansas, but an unfavorable month for farm work. The average snowfall was 6.8 inches, which was the heaviest for February in six years. Much corn and grain sorghums had not

[1] Contribution No. 548 from the Department of Entomology.
[2] Entomologists of the Agricultural Experiment Station.
[3] Extension Entomologist, Extension Division.
Recognition and appreciation for assistance given during the preparation of this summary are due to the same sources and largely to the same individuals who supplied information for recent, previous reports. They consist of the persons grouped in Table I.
[4] For the other summaries in this series, see the **Journal of the Kansas Entomological Society** for the summaries for 1931 (vol. 5); 1932 (vol. 6); 1933 (vol. 7); 1936 (vol. 10); 1937 (vol. 11); 1939 (vol. 13); 1942 (vol. 16); 1943 (vol. 17); and for 1944 (vol. 18) and the **Transactions of the Kansas Academy of Science** for 1934 (vol. 38); 1935 (vol. 39); 1938 (vol. 42); 1940 (vol. 44) and for 1941 (vol. 45).
[5] Notes and Table II based on Climatological Data: Kansas Section, Weather Bureau, U.S. Dept. of Commerce by S. D. Flora. Vol. 59, 1945. Flora, S. D. Kansas Weather: 1945. Kansas Acad. Science, Trans. 48(4); 394-408. March, 1946.

been removed from fields. Threshed sorghums, stored on the ground in western counties on account of lack of storage and shipping facilities, were damaged seriously. The snow-covered and muddy fields did not permit pasturing.

March was the fifth mildest March in 58 years, with more sunshiny days than usual, and a heavy fall of moisture over the eastern third of the state. Only a small per cent of the intended oats crop was sown, and planting of commercial fields of potatoes in the Kaw Valley was delayed from two to three weeks. Conditions were favorable for wheat, pastures, and alfalfa. Apricots, pears, plums, peaches, and cherries were in full bloom much ahead of the season.

April was abnormally cool, with heavy and frequent rains and excessive cloudiness. The precipitation was the greatest amount ever recorded in April, except in 1944. The soil in the eastern half of the state was soaked almost throughout the month. Freezing weather was frequent in western counties. On the 4th, a hard freeze occurred over the western half and on the 5th there was a freeze over the entire state. Early blooming fruit was seriously injured. Truck crops were not up. Wheat escaped any serious injury. Sowing oats was seriously hampered and much of the intended acreage was not sown.

May was a month of frequent and heavy rainfall over the northeastern quarter of the state, but the south central and southwestern counties were decidedly deficient. Temperatures over the state averaged considerably below normal for most of the month with excessive cloudiness in the northeastern portion, which caused backward conditions of crops and farm work. Serious overflows occurred in both the Big Blue and Little Blue Rivers, with moderate overflows along the Kansas, Republican, Solomon, Smoky Hill and Marais des Cygnes Rivers. Corn planting was late. Early-planted corn came up but made poor growth. Wheat suffered from dry weather in the southwestern counties and from lack of sunshine and warmth in the eastern part of the state. Pasture and alfalfa made fine growth.

June was a month of cool, rainy and cloudy weather, especially in the eastern part of the state. Farm work of all kinds and ripening of wheat were delayed. Damaging hail and wind storms occurred in many areas. It was the third coolest month since the state-wide record was begun in 1887. Temperatures ranged below normal almost the entire month. Spring work was so seriously delayed by water-soaked fields that much of the intended acreage of corn was not planted, and little opportunity occurred to cultivate what was up.

Wheat matured slowly and by the close of the month little had been cut by combines, though harvest by binders had begun in many areas. Heavy rains, wind and hail on June 30th caused extensive lodging of wheat and serious damage in widespread areas. Cutting of alfalfa was also hampered. It was an exceptionally favorable month for pastures.

July, with the exception of July 1927, was the coolest July in 21 years. The maximum temperatures for the first 18 days seldom rose as high as 90°. The last ten days, however, were abnormally hot. Heavy rains fell over

the eastern half of the state except the northeastern counties. The western half of the state had much less rain fall and was dry at the close of the month. Wheat and second alfalfa crop were all cut. Pastures and wild hay were excellent. Grain sorghum made a good start.

August was a month of considerable hot weather and deficient rain fall, which extended to most parts of the state and caused damage to growing crops in many sections. The rains were spotted and especially deficient in the north central and northwestern counties. The two western tiers of counties had excellent rains with amounts totaling from two to five inches. Conditions were favorable in these western counties for the preparation of a good seed bed and wheat seeding was well advanced. Plowing for the next crop of wheat had progressed rapidly in many other parts of the state, but by the close of the month the soil was so hard and dry that the preparation of the fields for wheat was practically suspended. Grain sorghums made very little growth. Pasture in general held up well.

September was hot and dry during the first three weeks of the month followed by prolonged and heavy rains over the eastern third of the state and the south central counties. There was a freeze and light snow in many western counties. The monthly totals of rain fall in the southeastern counties ranged from 10-15 inches and resulted in damaging overflows. In the northeastern and south central counties the totals ranged from 4-10 inches. Many western and north central counties were needing moisture at the close of the month. The soil was too dry and hard for preparation of seed beds or sowing wheat over the eastern two-thirds of the state until the rains began the last week of the month and then it was too wet for working. The soil in the extreme western counties was in good condition. Corn and grain sorghum suffered on account of the hot dry weather the early part of the month. Pastures made little growth until the rains came. Soybeans matured in the southeastern part of the state and broom corn harvest was well advanced in the southwest.

October was a month of several periods of Indian summer weather, nearly normal temperatures and sunshine, and the absence of heavy or prolonged rains. The fall of moisture over the state was decidedly deficient. There was an abundance of soil moisture over the east half due to the heavy rains near the close of the previous month. In parts of the western half, the upper soil was becoming dry by the close of the month. It was a favorable month for sowing wheat, except the extreme southwestern counties where the soil was too wet the early part of the month. The first killing frost of the season in the northwestern and east central counties occurred the 9th and over the middle and western sections of the state on the 22nd. There was no killing frost in the southeastern counties.

November was a mild and sunshiny month, but nearly a record-breaker for dryness. Two places in the state had as much as half an inch of moisture and many western counties failed to get a measurable amount on any day. It was the smallest amount since 1921, and the 5th smallest November average in 58 years. The month was too dry for wheat which made only slight

growth and furnished little or no fall pasture. However, very little blowing or winter killing was reported.

December was nearly a record-breaker over Kansas for heavy snowfall and prolonged cold weather. There also was more cloudiness than usual. The precipitation over the eastern two-thirds was sufficient to relieve the dry conditions which had prevailed through the two previous months.

It was the 6th coldest December on record and the coldest month in Kansas since January 1940. Many eastern and central counties had snowfall from 10 to 15 inches. The condition of wheat was materially improved over most of the eastern two-thirds of the state, but in several western counties the wheat was badly in need of moisture.

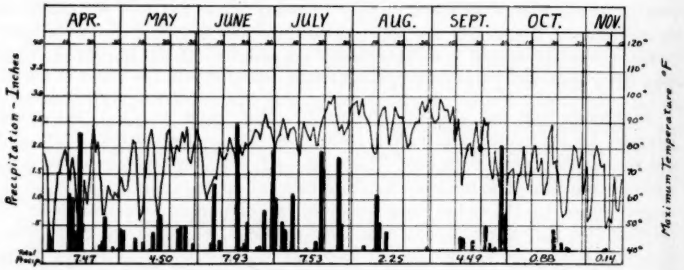

Fig.1. Daily rainfall and temperature chart for the growing season of 1945 at Manhattan, Kansas. Chart prepared by D. A. Wilbur.

CROP PRODUCTION SUMMARY FOR 1945*

While 1945 production of Kansas crops was 14 per cent less than in 1944, it was a good year for crops in Kansas. The farm value of 1945 crop production was $499,633,000. The winter wheat production was 207,961,000 bushels, making it more than ¼ of the 1945 winter wheat production in the United States of 823,177,000 bushels. The Kansas crop was exceeded only by the 1931 production of 251,885,000 bushels. The 1945 wheat crop alone valued at $309,862,000 was 84 per cent greater than the 1931 value of all farm crops produced in Kansas. The 1945 crop wintered well, and above normal temperatures in February and March permitted rapid plant growth. Cool April, May and June weather, however, retarded wheat development. Heavy rains, wind, and hail during June, especially the last week of the month, caused extensive lodging of wheat and serious damage in widespread areas.

The planting of corn and grain sorghums was delayed over much of the state because of wet fields, and these crops materially were damaged during August and early September because of dry conditions and hot weather. Early corn and sorghums matured well, but late fields were injured by freezes. The corn crop, estimated at 72,864,000 bushels, was only 60 per cent

*From Kansas 1945 Crop Review, Kansas State Board of Agriculture, Statistics Division, Dec. 20, 1945. Mimeographed Release.

Table II.

Summary of Weather Data for the State of Kansas for the period September 1, 1944, to December 31, 1945.

	Temperature in degrees Fahrenheit					Precipitation in inches					
	State Mean	Maximum	Minimum	Mean for 58 years	Departure from normal	State Average	Average for 58 years	Departure from normal	Eastern third	Middle third	Western third
September, 1944	69.2°	103°	29°	67.7°	—0.5°	1.92	2.81	—0.89	2.95	2.12	0.69
October	58.9°	91°	25°	57.3°	+1.6°	1.73	1.97	—0.24	2.29	1.65	1.25
November	45.7°	85°	5°	43.3°	2.4°	1.96	1.27	0.69	2.71	2.01	1.15
December	30.8°	64°	—5°	33.1°	—2.3°	2.15	.90	+1.25	3.58	2.02	0.86
January, 1945	32.6°	68°	—9°	30.0°	+2.6°	0.88	0.69	+0.19	0.62	0.93	1.10
February	35.2°	79°	2°	33.2°	+2.0°	0.91	0.99	—0.08	1.25	1.06	0.43
March	50.3°	87°	—3°	43.4°	+6.9°	1.96	1.45	+0.51	4.23	1.43	0.23
April	52.0°	92°	6°	54.7°	—2.7°	5.58	2.69	+2.89	7.68	6.03	3.03
May	61.6°	105°	23°	63.9°	—2.3	3.50	3.81	—0.31	5.39	3.38	1.73
June	68.0°	102°	37°	73.8°	—5.8°	4.72	4.03	+0.69	6.80	4.22	3.14
July	77.2°	108°	47°	79.2°	—2.0°	3.64	3.14	+0.50	4.26	4.25	2.40
August	78.5°	110°	44°	78.0°	+0.5°	2.35	3.18	—0.83	2.55	1.90	2.60
September	69.2°	108°	22°	69.7°	—0.5°	4.89	2.84	+2.05	7.84	5.04	1.79
October	57.4°	93°	14°	57.3°	+0.1°	0.81	1.95	—1.14	0.97	0.87	0.60
November	45.8°	88°	0°	43.3°	+2.5°	0.15	1.25	—1.10	0.33	0.06	0.06
December	27.5°	72°	—24°	33.0°	—5.5°	0.81	0.89	—0.08	1.11	0.88	0.45
Averages, totals, or extremes for 1945	54.6°	110°	—24°	54.96°	—4.2°	30.20	26.91	+3.29	43.03	30.05	17.56

of the previous year's crop. The production of all sorghum for grain in 1945 was 16,632,000 bushels or one-third of the record crop of 49,468,000 bushels. Sorghum for forage was 2,350,000 tons or about 24 per cent less than in 1944. Production of soybeans, 2,740,000 bushels, was second only to the 1944 crop of 3,315,000 bushels. The excessive spring rains delayed planting of oats, barley, and flax and resulted in the lowest yields for these crops in many years. The production of oats was estimated at 17,668,000 bushels compared with the 1944 crop of 27,738,000 bushels or the 10-year (1933-42) average production of 35,931,000 bushels. The barley crop of 6,702,000 bushels was less than one-half the 1944 production of 14,144,000 bushels. Flaxseed production of 695,000 bushels, except for last year, was the smallest since 1938. The all hay production of 2,669,000 tons compares favorably with the 2,767,000 tons produced in 1944. Spring and early summer conditions were favorable for hay crops, but dry August and September weather sharply reduced the yield of late cuttings.

The harvested potato crop of 18,000 acres, was the smallest since 1868. The yield was 1,476,000 bushels. The alfalfa seed production of 220,000 bushels was second only to the 1943 crop of 238,000 bushels. Red clover seed crop of 37,000 bushels exceeds all previous crops and compares with 34,000 bushels in 1944. Sweet clover seed was 119,000 compared with 112,000 bushels in 1944. Lespedeza seed was 19,200,000 lbs.; sudan grass 3,500 bushels; broom corn 1,400 tons; popcorn 9,240,000 lbs.; commercial apples 272,000 bushels; peaches 63,000 bushels; pears 117,000 bushels; grapes 4,500 tons. The estimated honey crop was 2,601,000 lbs. or an average yield of 51 lbs. per colony compared with 1,540,000 lbs. or an average yield of 35 lbs. per colony in 1944. The amount of beeswax for 1945 was 52,000 lbs. compared with 32,000 lbs. in 1944.

Descriptive account of the More Important Insect Activities and Climatic Relationships During 1945

Ants of various species continued at a high population level in homes. They were, however, probably no more abundant than in 1944.

The yellow ant began emerging in local homes the latter part of January and continued emerging in and around homes until late summer.

The acrobat ant (Cremastogaster lineolata) was probably the species most

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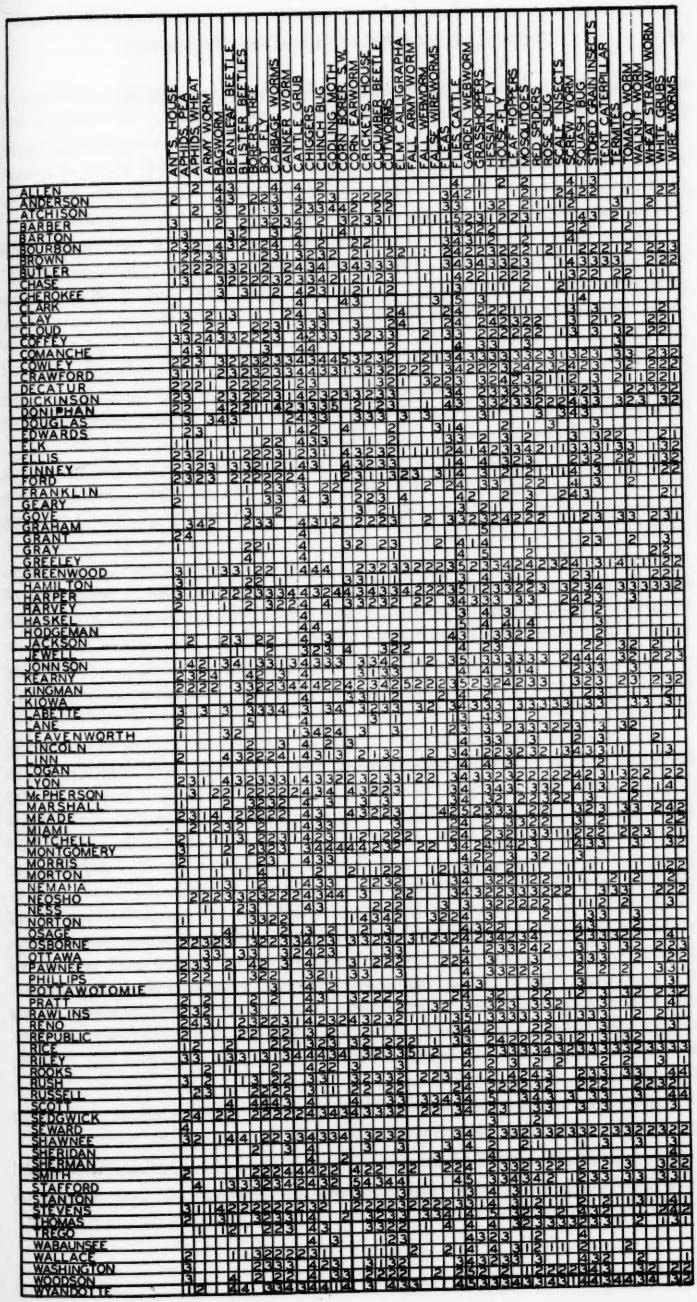
Table III. Population summary of the more common and important insects in Kansas for 1945, as indicated by questionnaire score sheets from nearly all counties.

Key—

1. Scarce.
2. Plentiful, but damage was neither noticed nor reported.
3. The species was abundant. Some damage was either seen or reported.
4. Local outbreaks. The species was doing severe damage in certain fields.
5. The species was in general outbreak. The insects were doing their greatest damage or were as plentiful as they ever get in a locality.

Note: This table represents the population scorings by counties for each species of insect listed in the questionnaires, in so far as reported. To use this table, copy the scores for each species in the counties of a state map.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APHIDS, WHEAT
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BEAN LEAF BEETLE
BLISTER BEETLES
BORERS, TREE
BOXELDER BUG
CANKER WORM
CATTLE GRUB
CHIGGERS
CHINCH BUG
CORN BORER, S.W.
CORN EARWORM
CRICKETS, HOUSE
CUCUMBER BEETLE
CUTWORMS
DIAMOND BACK MOTH
FALL ARMY WORM
FALL WEBWORM
FALSE WIREWORMS
FLEAS
GARDEN WEBWORM
GRASSHOPPERS
HESSIAN FLY
LOCUSTS
MOSQUITOES
RED SPIDERS
ROSE SLUG
SCALE INSECTS
SCALY BUG
SCUTCH BUG
STORED GRAIN INSECTS
TENT CATERPILLAR
TERMITES
TOMATO WORM
WEEVILS
WHEAT STRAW WORM
WHITE GRUBS
WIRE WORMS
ALLEN
ANDERSON
ATCHISON
BARBER
BARTON
BOURBON
BROWN
BUTLER
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CHEROKEE
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GREELEY
GREENWOOD
HAMILTON
HARPER
HARVEY
HASKEL
HODGEMAN
JACKSON
JEWELL
JOHNSON
KEARNY
KINGMAN
KIOWA
LABETTE
LANE
LEAVENWORTH
LINCOLN
LINN
LOGAN
LYON
McPHERSON
MARSHALL
MEADE
MIAMI
MITCHELL
MONTGOMERY
MORRIS
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OSAGE
OSBORNE
OTTAWA
PAWNEE
PHILLIPS
POTTAWOTOMIE
PRATT
RAWLINS
RENO
REPUBLIC
RICE
RILEY
ROOKS
RUSH
RUSSELL
SCOTT
SEDGWICK
SEWARD
SHAWNEE
SHERIDAN
SHERMAN
SMITH
STAFFORD
STANTON
STEVENS
THOMAS
TREGO
WABAUNSEE
WALLACE
WASHINGTON
WOODSON
WYANDOTTE

often sent or brought in for identification with **C. laeviuscula** var. **clara** a close second. Winged forms were in flight on March 28.

Several species of **aphids** were more plentiful than last year and above normal. They include the pea aphid, apple aphids, snowball aphid, chrysanthemum aphids, and melon aphids on cucumbers, squash, watermelons, and cantaloup.

Green bugs were reported in damaging numbers on oats and wheat only in Rush County by the Extension Entomologist but they were present in many south central counties as early as the latter part of April. There were many reports of aphids in wheat but most were based on other species. Green bug damaged spots were notably absent in the state. They were observed in Stafford and Ellis Counties but they could be taken in small numbers nearly everywhere. R. H. Painter stated that they were most abundant on Pawnee with Comanche, Turkey, and Nebred wheats in this approximate order.

The apple grain aphid (Rhopalosiphum prunifoliae) was plentiful on the roots of wheat in the fall of 1944 in many western counties. Some persons thought they may have contributed to the poor condition of wheat in some fields in the spring of 1945.

Apple aphids on apple buds and blossoms in Doniphan County were exceptionally plentiful in early April and caused a severe withering of blossoms and dropping of setting fruit. There was only about a fifth of a set of fruit as a result of the aphids and cold weather.

Arbor vitae aphids were probably plentiful in many parts of the state because correspondents mentioned that flies and butterflies were common on those bushes.

Pea aphids were abundant in Kansas in 1945, but most damage to alfalfa occurred in western, especially southwestern counties. By mid-April, pea aphid numbers were equal to last year; but the cold, wet (twice normal rainfall) spring favored alfalfa growth in all but southwest Kansas, and it outstripped the aphids. C. M. Slagg reported damage at that time in Barber, Harper, and Sumner Counties. By May 1st, damage had occurred in Barton, Pawnee, and Stafford Counties. Alfalfa was being cut during mid-May though only about 4 inches tall. Pea aphids were reported abundant at Hays by L. C. Aicher, and alfalfa stalks from Coldwater with many convergent lady beetles on them no doubt indicated the presence of pea aphids there. Pea aphid injury was a part of the general injury by cold, wet weather and some fungus disease which caused the plants to be blackish. Young alfalfa stands were particularly adversely affected by the cold, wet weather, especially during April. There was almost no alfalfa bloom in the state on the first crop.

Green ash aphids which cause the leafy galls were common in nursery plantings in Kansas in 1945 up to mid-summer.

The snowball aphid (Anuraphis viburnicola) was exceptionally plentiful in Riley County from mid-April through June. Apparently they were plentiful in many other parts of the state also.

The **black chrysanthemum aphid (Macrosiphoniella sanborni)** was plentiful in April on outdoor plantings and continued so until hot weather in Riley County and perhaps in many other counties.

Woolly apple aphids were plentiful on elms and at the usual places on young apple trees.

The galls of the **grape Phylloxera** were reported abundant on grape leaves at Council Grove the latter part of July.

Apple curculio feeding on dropped apples in the Wathena district was observed by Elbert Eshbaugh. This pest had practically disappeared, but these observations indicate it is increasing in numbers even in well-sprayed orchards.

Bagworms were plentiful in some nurseries and on evergreens in private plantings in 1945. They were particularly abundant in northeastern Kansas counties during June. They have extended throughout central Kansas and to Wallace, Thomas, Scott, and Stevens counties in western Kansas.

Bees did well after an abnormally early start followed by a set-back due to cold weather and produced a much larger crop of honey than in 1944. Brood rearing was rapid during March because of the warm weather, and the colonies consumed their stores. Then many colonies starved during the cold, wet April and May. The first swarm emerged in the college apiary on April 28th. They had brought in considerable pollen during the good flying weather of March. Some chilled brood was observed after the cold weather of April 2nd and 3rd; but, in general, the bees were three weeks ahead of the calendar. There was poor flying weather during fruit blooming. The fine crop of white and yellow sweet clover and of white clover enabled many colonies in southeastern Kansas to make a good honey crop. There was no late summer and fall honey flow.

Bean leaf beetles (Cerotoma trifurcata) were abundant and destructive throughout Kansas in 1945. It was common to observe holes in the foliage of beans during July and August. This species was abundant in Riley County.

Boxelder bugs were scarce in 1945.

Cankerworms were not especially abundant nor destructive in 1945. They were widespread and the scorings show that they were most numerous in southeastern Kansas. The first fall cankerworm moth emerged in Riley County on January 17, and the first moth of the spring species emerged January 26 according to R. L. Parker though January was warmer than usual. A warm period on February 9 and 10 enabled many moths to emerge.

By mid-May the larvae were half to two-thirds grown. Only slight damage occurred in Riley County. This was done to the foliage on the short branches. No spraying was done. Elms were delayed coming into full leaf by the heavy seed crop and the cold April and May weather.

Male moths were reported flying in Topeka on March 28.

Carrot weevils were not as destructive in northeastern Kansas as in previous years. Carrots in many gardens showed no damage by the weevil when dug in the late fall.

Cattle grubs appeared to be declining in numbers on Kansas raised cattle due to the large control campaigns. Native cattle were reported to have few grubs, but cattle shipped into Kansas from the Southwest were fairly heavily infested.

Cattle lice were widely reported in the state, and more attention is being given to their control than ever before. Derris and DDT sprays and powders are being increasingly used. Lice were probably no more abundant than usual. Cattle raisers have just begun to take them seriously.

Chalcids occurred in alfalfa seed in abundance during the latter part of the summer. Alfalfa seed for planting was exceedingly scarce, but Kansas produced its second largest crop of alfalfa seed in 1945, the total production having been 220,000 bushels.

Chinch bugs were less abundant in 1945 than in 1944 and far below the expected numbers. The Bureau of Entomology survey in the fall of 1944 showed an area around McPherson and the northern tier of counties from Republic eastward with a heavy overwintering population, the flint hills section or two or three counties wide from Sumner to Douglas Counties classed as moderate, and the rest of eastern Kansas or west to Jewell and Kingman Counties as light. They were scarce almost everywhere in the spring and few eggs were deposited. The frequent rains and low temperatures during May and June were unfavorable to them. They developed late and were abundant only in scattered areas in eastern Kansas. Few barriers were constructed. Some damage to corn and sorghums was reported from El Dorado and Marysville. Weeds, grasses, and slowly maturing grain furnished food for them, and there was no pronounced migration in most areas. but the adults scattered by flight The second generation of bugs caused some damage to Sudan grass at the agronomy farm the latter part of August. R. H. Painter observed them in volunteer wheat in McPherson County and adults in corn. Only a small population went into winter quarters.

Clover leaf weevils were normal in numbers and no more numerous than in 1944. The extension entomologist observed them particularly abundant in Ford County about mid-April.

Clothes moths continued at a high peak of abundance in Riley County particularly in April and May and in early fall. The webbing species (**Tineola bisseliella**) appeared to be the most common species.

Codling moths were comparatively abundant and destructive in 1945. An extremely light set of fruit and a large overwintering population of larvae combined with favorable weather for second brood development resulted in the most severe damage to the apple crop in recent years. Many orchards, due to the light set of fruit, were unsprayed.

Colorado potato beetles were again scarce but they were somewhat more plentiful than in 1944. The first generation of larvae developed later than usual, but only where no spraying was done did this species reach damaging numbers in commercial plantings. The first ones in Riley County were observed in May. The early ones seen were on volunteer potatoes.

Cutworms occurred in considerable numbers, probably outbreak numbers in Stevens, Seward, Ford, and Meade Counties. The army, dingy, and clay backed species were sent in from southwestern counties. The extension entomologist observed cutworm damage to alfalfa in this area in March. These insects were normal and caused no unusual losses in central and eastern Kansas. Large number of cutworm moths were reported around doors, screens, trees, bushes, and in garages at Garden City, indicating the usual number of larvae of at least two species must have been present; but no damage was observed or reported.

The **elm calligrapha**[3] was more widely distributed and more injury to elm foliage was done by this new pest in 1945 than before.

Elm seed wing midge larvae dropped from elm trees the latter part of March in Manhattan in large numbers. They were observed on sidewalks, especially in the joints between sections and in spoutings. There was an exceptionally heavy crop of elm seed this spring. This midge causes galls on the wings of elm seed. The freezes of April 2 and 3 probably killed many of the larvae.

European cornborer larvae **(Pyrausta nubilalis)** were found by L. A. Calkins infesting sweetcorn in Wyandotte, Johnson, Douglas, and Shawnee Counties from July 10 to August 25. All were first generation larvae, and the infested sweet corn occurred in gardens in Rosedale and Argentine (Kansas City, Kansas), Lawrence, Topeka, Overland Park, and Olathe. Extensive surveys, particularly of field corn, in other eastern Kansas Counties by Mr. Calkins and R. G. Yapp failed to reveal other infestations. This is the first real invasion of Kansas by this destructive pest.

False wireworms have not been injurious for the past three years. They increased in 1945, and some damage was done in 13 western counties. March wheat had to be re-seeded. The dry fall favored injury.

Flies of most species were more plentiful in 1945 than in 1944.

Hornflies were no more abundant on cattle in 1945 than they generally are in wet seasons. They were about as plentiful as in 1944. The large scale DDT spraying program under the extension entomologist and cooperators focused attention on them. They were present in numbers in early May. They represented the overwintering survivors. They reached peak numbers by mid-June and continued annoying until August when they declined presumably because of the dry weather.

Screwworm flies appeared in two peaks of abundance this year—in early May and October. Early reports were received from the Great Bend region where they were introduced on cattle from Mexico and southern Texas. Autumn cases were especially numerous in eastern Kansas affecting calves and hogs.

Stable flies appeared to be somewhat less abundant than last year or than average. The seasonal history followed that of hornflies.

Fleas on pets and in homes continued at a high peak of abundance but

[3] Dean, Geo. A. The elm calligrapha. Kansas Agricultural Experiment Station Circular 234. 7 p. Feb. 1946.

Cattle grubs appeared to be declining in numbers on Kansas raised cattle due to the large control campaigns. Native cattle were reported to have few grubs, but cattle shipped into Kansas from the Southwest were fairly heavily infested.

Cattle lice were widely reported in the state, and more attention is being given to their control than ever before. Derris and DDT sprays and powders are being increasingly used. Lice were probably no more abundant than usual. Cattle raisers have just begun to take them seriously.

Chalcids occurred in alfalfa seed in abundance during the latter part of the summer. Alfalfa seed for planting was exceedingly scarce, but Kansas produced its second largest crop of alfalfa seed in 1945, the total production having been 220,000 bushels.

Chinch bugs were less abundant in 1945 than in 1944 and far below the expected numbers. The Bureau of Entomology survey in the fall of 1944 showed an area around McPherson and the northern tier of counties from Republic eastward with a heavy overwintering population, the flint hills section or two or three counties wide from Sumner to Douglas Counties classed as moderate, and the rest of eastern Kansas or west to Jewell and Kingman Counties as light. They were scarce almost everywhere in the spring and few eggs were deposited. The frequent rains and low temperatures during May and June were unfavorable to them. They developed late and were abundant only in scattered areas in eastern Kansas. Few barriers were constructed. Some damage to corn and sorghums was reported from El Dorado and Marysville. Weeds, grasses, and slowly maturing grain furnished food for them, and there was no pronounced migration in most areas. but the adults scattered by flight The second generation of bugs caused some damage to Sudan grass at the agronomy farm the latter part of August. R. H. Painter observed them in volunteer wheat in McPherson County and adults in corn. Only a small population went into winter quarters.

Clover leaf weevils were normal in numbers and no more numerous than in 1944. The extension entomologist observed them particularly abundant in Ford County about mid-April.

Clothes moths continued at a high peak of abundance in Riley County particularly in April and May and in early fall. The webbing species **(Tineola bisseliella)** appeared to be the most common species.

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were probably no more common than last year. They were reported from many parts of the state, the peak being August and September. There appeared to be an increase in the numbers of dogs particularly in towns with recent population increases. DDT sprays and powders began to be used, and results were apparently good.

Grape berry moths were abundant and caused severe damage to grapes in northeast Kansas. Many grape berries were wormy at picking time. Some vineyards were not picked because of damage by black rot and the berry worm.

Grasshoppers constituted a problem only in three western counties, but elsewhere there was a small general increase during 1945. The year opened with a threatening overwintering population in over 40 counties west of the line between Jewell and Barber Counties. They were scarce and of little or no consequence east of that line all season. They were observed in destructive numbers in the alfalfa growing areas of northern counties in the western half of the state.

Hessian fly was present at least in small numbers on the wheat harvested; but in spots—counties and fields—the population was high, and noticeable damage was done. There was, however, less damage than for the past 5 years. The wheat crop was so large and the spring growing conditions were so good that this pest had little effect on the over-all wheat situation. Hessian fly damage was observed and reported around Newton and west to Little River in fields at Russell, Hays, Pratt, (Kingman and Reno Counties), and at the Goddard Experimental Fields. The infestation over the entire two-fifths of the state was spotted though favorable to the insect. The harvest survey by the Bureau of Entomology reported a moderate to heavy infestation only in the middle-third section of the state. The stem infestation was determined to be 15.1% in the northern half of this belt and 12.5% of the southern half. The corresponding infestations in the eastern third were 7.3% and 6.4% while in the western third it was 1.8% and 0.9%. Dr. R. H. Painter listed the following counties as having high average stem infestation: Atchison—10.7%, Riley—17%, Neosho—60%, Jewell—26%, Saline 36.3%, Kingman—24.3%, and Sumner 30.2%. This insect was present in Greeley and Wallace Counties, so it occurred entirely over the state.

There was probably no summer brood of hessian fly because of the dry August and September. There was little volunteer wheat this year. The peak of infestation of young wheat occurred at the time of the safe planting date or a little later. The infestation was spotted, and because of the small amount of growth of wheat before cold weather, severe winter injury from this pest was expected.

Horse bot flies were as numerous and annoying as in 1944. They had fewer horses to attack since there has been a marked decline in the population of horses on farms.

Horse flies (Tabanids) were again in outbreak in southeastern Kansas during early August. There was considerable annoyance to cattle, horses, pigs and man. A sharp reduction in milk supply was reported. It was ob-

served that the horse flies alighted on the asphalt between the joints on the highway, and many were caught on car radiators.

A single **Japanese beetle** was taken during the operation of 325 traps in eastern counties June 25 to August 10, 1945. This beetle was taken in a trap along the Santa Fe Railroad yards in the Argentine district of Kansas City, Kansas, near the Missouri-Kansas state line. This single beetle was unquestionably a transient as surveys revealed no larvae or other adults. The traps were operated near the airports at Wathena, Kansas City, Kansas, Olathe, Lawrence, Topeka, and Wichita and the railroad yards of the Argentine district of Kansas City.

Leafhoppers were normal in numbers but less damaging than in the previous year.

Apple leafhoppers were abundant on apple, cultivated and wild grape, red bud, and woodbine foliage in August and September.

The **potato leafhopper** was plentiful during June, and potatoes in the Kaw Valley showed some injury from them. The potato leafhopper was numerous on potatoes, soybeans, and alfalfa in July. Slight curling of foliage was observed due to leafhoppers.

Mosquitoes were exceptionally plentiful during June and were more common than usual during the late fall. Heavy rains in May and June provided ample breeding places. They were reported annoying at Hutchinson.

Widely scattered cases of sleeping sickness in horses were reported from 16 counties none of which were in the Southwest.

The **juniper mealybug** continued to occur in Wichita and Pratt according to H. B. Hungerford. A survey in Wichita revealed 264 infested properties.

Onion plant bugs were present in less than normal numbers, but some damage was observed in eastern and central Kansas in June. The tips of the leaves were dead but the plants were not seriously affected.

Oriental fruit moth appeared to be increasing in eastern Kansas in 1945. The second generation caused some damage to fruit.

Several species of **mites** caused some damage in 1945. Two species of mites did considerable damage to wheat in western, especially southwestern, Kansas, in April and early May. Fields planted in last year's wheat stubble, with little seed bed preparation, as usual were most severely attacked. Leaf rust also contributed to poor condition over much of the state.

Red spider mites were more plentiful up to August 1 than had been anticipated in a cool, wet, cloudy period. Considerable damage was done to evergreens, especially cedars, in many parts of the state in early summer. The mites largely disappeared as usual by mid-August. They were scarce in the fall on apple trees in northeastern Kansas.

The **potato and tomato psyllid (Paratrioza cockerelli)** was taken in the college greenhouse June 12. The species was abundant and caused damage to tomatoes. Specimens were identified by Tuttle. This is a first report for the state.

Sheep tick flies were less numerous on native sheep than in 1944, but many lambs from Wyoming, Montana, and other western states were heavily infested when they arrived in Kansas.

Smut beetles (Phalacrus politus) were observed by R. H. Painter to be more common than usual on wheat in early June in southwestern Kansas. They were particularly abundant at Meade.

Southern corn root worms killed some popcorn plants in Riley County in June.

Common stalk borers (Papaipema nebris) were scarce in corn during 1945. R. G. Yapp found only two larvae during several weeks of scouting for the European cornborer.

Half grown larvae of this species damaged young peach trees in Skinner's nursery at Topeka. They burrowed into one-year-old peach sprouts particularly in rows next to grassy or weedy fields. This is a first report of these larvae burrowing into the twigs of young nursery stock in Kansas.

The southwestern corn borer was as numerous and destructive as in 1944 and it spread to several additional counties. Corn planting was delayed from one to three weeks by cold, wet weather. R. H. Painter determined the infestation by the first generation in Butler and Cowley Counties at 5 to 20%. There was a large increase and the second generation reached 50 to 90% infestation in some fields. This insect was found as far east as Riley and Cowley Counties with individual larvae east of this line. The largest center of infestation and damage is in Pawnee, Stafford, Kingman, and counties south of them. It spread to five or more additional counties to the east of the former area. The spread was most marked in the southern counties. There are now approximately 75 counties in which this pest has been taken. There has been a marked decrease in corn acreage in south central Kansas due in large part to this insect.

Squash bugs were less abundant during the early part of the season than usual but they attained normal numbers during August when some insecticidal applications were necessary. A good crop of squash was obtained generally.

The sweet potato leaf beetle (Typophorus viridicyaneus)[6] was reported in sweet potato fields of E. K. Crunk near Oxford, Kansas, the latter part of September.

Strawberry leafrollers caused little damage to strawberry plantings during 1945. Some fields had a large number of larvae going into hibernation. This carry over could cause severe damage in 1946.

Strawberry rootworms were abundant and destructive in northeast Kansas during 1945 according to Elbert Eshbaugh. Most strawberry fields in Doniphan County were damaged by the feeding of the adults and larvae. Some fields were entirely destroyed. A large population of beetles in the

[6] Hungerford, H. B. The sweetpotato leaf beetle . . . in Kansas. Jour. Kans. Ent. Soc., 18(4):154-155. 1945.
Parker, Ralph H. Additional host and distribution records of the sweetpotato leaf beetle . . . Ibid 19(1):11-12. Jan., 1946.

late summer resulted in many beetles going into hibernation in late September and October. The damage has been most severe since 1941.

Termites were no more abundant nor destructive in 1945 than in 1944. The winged forms appeared in early April in Riley County as a result of the exceptionally warm March.

Mr. H. L. Davids of the Underhill Terminix Company of Wichita reported in September finding a colony of Kalotermes in a residence in Wichita. While the dry wood termites have been reported previously in Kansas, this is the first report of a colony which is known to have been established for as much as two years in the state.

White grubs have been gradually increasing for the last three years according to H. R. Bryson, particularly in truck patches, wheat fields and on lawns. The wet May and June caused them to feed near the surface of the ground. They were reported damaging lawns at Mankato and potatoes in Riley the latter part of July. The **green June beetle** was reported frequently during August from southeast Kansas, and injury to ripening peaches was reported from the Kansas City district.

The **wheat straw worm** was scarce in 1945 and caused very little damage.

The **wheat white grub** was less numerous and did less damage to this crop in central counties than is usual in the odd numbered years. This was the grub year in the two-year life cycle.

Cyclocephala immaculata again caused some damage to wheat in the entire western half of the state, especially Rawlins, Sherman, Thomas, Osborne, Scott, Rush, Stevens, and Meade, during the fall of 1944 and the spring of 1945. About the same amount of damage was done to fall sown wheat in 1945. These beetles lay their eggs on decaying stubble in the summer. There is a one-year life cycle.

Wireworms were apparently less numerous than in 1944 or usual. **Aeolus elegans** was reported attacking the germinating seeds of sorghums in Phillips, Riley, and Neosho Counties.

Summary and Conclusions

The year 1945 averaged approximately normal as to temperature, but rainfall was above normal. The year opened with three months of mild weather and above normal precipitation. The spring appeared to be early, but April and May were abnormally cold and wet. Planting of crops was delayed. June was likewise abnormally cool and wet. July opened with cool weather, but hot weather arrived near the end of the month and continued during August and September. Rainfall was markedly deficient during this period except in the western tier of counties, and the drouth in the south central section continued until December. October and November were nearly normal as to temperatures and the fall was considered delightful. It was ideal for insects to deposit eggs for wintering or go into hibernation. December was abnormally cold, the coldest part of the winter, and had exceptional amounts of snow.

It was a good crop year in spite of the cold, wet, late spring and the hot,

dry, late summer and early fall. Insects were not abnormally abundant nor destructive. The weather presumably hindered the increase of grasshoppers and chinch bugs but was largely favorable to hessian fly. DDT began to be used in the control of cattle lice, biting flies on live stock and in gardens.

The following insects and related forms occurred in **outbreak numbers** (scored at 5): Apple aphids (Doniphan County), bagworms, screwworm flies and horseflies (southeastern Kansas).

The following species with those above were **more numerous** in 1945 than in 1944: Apple grain aphids, snowball aphid, green ash aphid, chrysanthemum aphid, grape Phylloxera, apple curculio, alfalfa seed chalcid, Colorado potato beetle, cutworms, elm calligrapha, elm flower midge, false wireworms, grasshoppers, Oriental fruit moth, red spider mites, white grubs, wheat straw worm, tomato worms, rose slugs, bruchids, wireworms.

The following species were **as plentiful** and destructive as in 1944: Ants, pea aphids, woolly apple aphid, bean leaf beetles, blister beetles, canker worms, cattle lice, clothes moths, codling moths, fleas, horn flies, house flies, stable flies, horse bot flies, southwestern corn borer, strawberry rootworms, termites, Cyclocephala sp., hackberry petiole gall, wood borers, cabbage worms, corn ear worm, chiggers, cucumber beetles, mosquitoes, scale insects, squash bug, and tent caterpillars.

The following species and those in the next paragraph were **less plentiful** in 1945 than in 1944: Armyworms, fall armyworm, green bugs, carrot weevils, cattle grubs, chinch bugs, clover leaf weevils, field crickets, hessian fly, leafhoppers, onion plant bugs, sheep tick fly, stored grain pests, strawberry leafroller, wheat white grub, green striped maple worm, red bud leaf roller, and fall webworm.

The following species were **scarce** or absent in 1945: Arbor vitae aphids, box elder bugs, common stalk borer, datanas, garden webworms, and pale western cutworm.

THE GENUS MINTHOZELIA IN THE UNITED STATES, (DIPTERA, TACHINIDAE)[1]

H. J. REINHARD
College Station, Texas

The genus **Minthozelia** was described by Townsend in 1919 with **montana**, new, as the type and sole original species (Proc. U.S. Nat. Mus., 56:556). The description is based upon a single female specimen and hitherto no additional material appears to have been mentioned in literature. More recently Townsend redescribed the characters of the type specimen without adding materially to the brief and inadequate original characterization (Manual of Myiology, Part 9, 1939, 80). Although no additional specimens of **montana** have come to light, the accumulation of several allied forms may be utilized at least for a liberal interpretation of the generic characters.

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[1] Contribution No. 950, Division of Entomology, Texas Agricultural Experiment Station.

The new species described below differ from the genotype in having four post-sutural dorsocentral bristles and more or less differentiated recumbent discals on the intermediate abdominal segments, especially in the male. In other respects the characters appear in close agreement and the species are assigned provisionally to **Minthozelia**, pending the accumulation of additional material in the type species adequate to establish its limits of variability. Nothing is known concerning the habits or host relationships of the genus. It is mainly southwestern in distribution and none of the species apparently has been taken in large numbers in any locality. I am indebted to Dr. R. H. Beamer and C. F. W. Muesebeck for the loan of material and to Chas. T. Greene for notes on the type specimen in the U.S. National Museum. Types of the new species are in the Snow Entomological Collections, U.S. National Museum and in my collection.

Generic characters.—The species here included may be characterized in common as follows: Length 5.5 to 10 mm. Well narrowed and slightly elongate in build with abdomen compressed, especially in male; head slightly wider than high, frontal profile arcuate, strongly sloped and one-half to three-fourths longer than receding facial; antennal axis far below eye middle, about two-thirds head height and longer than vibrissal axis; clypeus nearly flush; epistoma short, not narrowed, gently bowed forward from clypeal plane; vibrissae on oral margin near lower edge of head; facial ridges and parafacials bare; latter equibroad, but narrower than clypeal width; frontal vitta gradually narrowed toward vertex, narrower than parafrontal except sometimes on anterior extremity; inner verticals straight to divergent, outer ones smaller but distinct in female; ocellars weak to hair-like, usually two or more pairs curved outwardly; frontal bristles in a single row on outer margin of vitta, directed inward and strongly decussate, stopping at base of antennae; two proclinate and one reclinate orbitals in female; antennae nearly as long as face, third segment about twice length of second; arista shorter than antennae, long plumose to tip, proximal segments short; eyes bare, oblique, not reaching vibrissal level; cheek three-tenths to two-fifths eye height; proboscis short, labella large; palpi slender with tips slightly swollen. Thoracic chaetotaxy: Acrostichal 3,3; dorsocentral 3, 4 (3,3 in **montana**); intraalar 3; supraalar 3; notopleural 2; humeral 2-3; post-humeral 2-3; presutural 1 (outer); postalar 2; intrapostalar well developed; sternopleural 2,1; pteropleural weak; scutellum with 2 lateral, 1 strong decussate apical and 1 smaller discal pair; propleura and prosternum bare; infrascutellum normally developed; sides of postnotum beneath calypters bare. Abdomen longer than thorax, compressed and pointed apically especially in male; first and second segments with a pair of good-sized median marginals, third and fourth each with a marginal row; intermediate segments with one or more pairs of recumbent discals in male but usually weaker or entirely lacking in female; anal segment usually without discals above; sternites covered; female genitalia not adapted for piercing. Legs elongate, moderately slender; hind tibiae not ciliate, mid tibiae with one bristle near middle on outer front side; apical segment of fore tarsus moderately widened in female; claws and pulvilli short in both sexes. Wings

reaching beyond tip of abdomen, subhyaline; first vein bare, third haired near base; first posterior cell narrowly open shortly before extreme wing tip, bend of fourth vein obtuse, without stump or fold, not far from hind margin of wing; last section of fifth vein about one-fifth length of preceding; hind cross vein bicurved, very oblique, reaching fourth nearer bend than small cross vein; costal spine small to vestigial.

As a detailed characterization of each species would consist mainly of a repetition of the above listed characters, they are omitted for the most part from the following specific descriptions. In the limited material available for study the species are readily distinguished on color characters as indicated in the acompanying key. Only three of the seven species recognized are known in both sexes.

Key to Species of Minthozelia

1. Male (unknown in **montana, mira** and **ruficauda**) ..... 2.
   Female (unknown in **metalis**) ..... 5.

2. Parafrontals silvery white pollinose ..... 3.
   Parafrontals with heavy opaque gray pollen tinged with yellow towards vertex, abdominal segments two and three gray pollinose well beyond middle above, apex of fourth red, Ohio, North Carolina ..... **metalis**, n. sp.

3. Abdomen distinctly reddish on sides ..... 4.
   Abdomen entirely black, segments two and three silvery on basal two-fifths, fourth with row of discals; third antennal segment largely black, Arizona ..... **nitens**, n. sp.

4. Fourth abdominal segment black, usually without discals; genital forceps narrow tapering gradually from base to tip, Texas, Arizona ..... **argentosa**, n. sp.
   Fourth segment red on apex, bearing discals above; forceps much wider at base, equibroad to apical third thence suddenly narrowed to a short beak, latter with tip compressed and rounded in profile, Arizona ..... **gracilis**, n. sp.

5. Four postsutural dorsocentrals ..... 6.
   Three postsutural dorsocentrals; cheek three-tenths eye height; abdominal segments two to four pollinose on basal third, Arizona ..... **montana** Townsend.

6. Abdomen black to tip ..... 7.
   Abdomen black with anal segment red at least on apex ..... 8.
   Abdomen wholly red, translucent at sides, intermediate segments pollinose on basal fourth to third; cheek nearly two-fifths eye height, Texas ..... **mira**, n. sp.

7. Frontal vitta at base of antennae subequal width of parafrontal; third antennal segment largely black; abdominal segments two and three pollinose on basal third or less ..... **nitens**, n. sp.
   Frontal vitta about one-half as wide as parafrontal; antennae

wholly red; abdominal segments two and three pollinose on basal two-fifths or more ..... **argentosa**, n. sp.

8. Anal segment of abdomen wholly orange red, without any pollen on basal margin above, segments two and three with sharply limited pollen bands restricted to basal fifth at sides and widening to about basal third on median line above, New York..... **ruficauda**, n. sp.

Anal segment blackish and pollinose on basal third, remainder shiny red; intermediate segments silvery on basal third to two-fifths the pollen not sharply limited on hind margin of fasciae except at sides ..... **gracilis**, n. sp.

Minthozelia montana Townsend

Minthozelia montana Townsend, Proc. U.S. Nat. Mus., 56, 1919, 556.—Manual of Myiology, Part 9, 1939, 80 (redescription).

Female.—Length 5.5 mm. Front at vertex two-sevenths head width and in profile three-fourths longer than face; ocellar triangle with about five small irregularly placed divergent hairs; parafrontals and parafacials silvery white pollinose; cheek three-tenths eye height; palpi yellow; frontal vitta brownish, narrower than parafrontal; antennae red, third segment slightly infuscated.

Thorax black, with heavy whitish pollen showing four indefinite dark vittae above; three post dorsocentrals; scutellum black, with scattered setulae above and one pair of discals about one-third as long as apical decussate pair; calypters glassy white. Wings clear, rather long and narrow. Legs black, fore tarsi somewhat widened.

Abdomen black to tip, basal third of segments two to four silvery pollinose, remainder of each shiny black tinged with red; intermediate segments equal and slightly longer than one and four, no discals; genitalia not adapted for piercing. Male unknown.

Holotype.—Female, Sixshooter Canyon, Pinal Mountains, Arizona, 5000 ft., September 2, 1917 (C. H. T. Townsend), in the U.S. National Museum.

Minthozelia argentosa, n. sp.

Male.—Length 8-9 mm. Front at vertex one-fifth head width, gradually widening to anterior fourth thence rapidly so into facial angle, frontal profile two-thirds longer than facial; head wholly silvery white pollinose with reddish ground color of cheek grooves apparent in certain angles; parafrontals bare except a few minute hairs along upper outer margin; ocellar triangle bearing about three pairs of divergent hairs, anterior ones approaching size of bristly hairs; frontal vitta velvety black, subequal parafrontal width on anterior extremity; antennae red, slender third segment tinged with black, not quite twice as long as second; palpi red; cheek two-sevenths eye height.

Thorax entirely silvery white pollinose, notum indistinctly vittate; chaetotaxy as mentioned above but the inner presutural bristle moderately developed; scutellum black; calypters large, semi-transparent, white. Wings long, narrow, subhyaline with a slight yellowish tinge extending nearly to hind margin; veins including costa yellow; epaulets blackish. Legs black,

long and moderately slender, rather weakly bristled; fore tarsus nearly one-half longer than tibia.

Abdomen compressed and pointed apically, black with sides broadly reddish, last three segments silvery on basal half or more; two to three pairs of recumbent discals on segments two and three, none on fourth; anal orifice long and narrow, forceps united, slender tip compressed and widened in profile; accessory process extra slender, curved inward, about as long as forceps; fifth sternite retracted.

Female.—Vertex about three-tenths head width, front widening gradually to antennal base; outer verticals one-half as long as inner ones; one reclinate and two proclinate orbitals, all stronger than frontals; third antennal segment somewhat widened on apical half, wholly red; frontal vitta barely one-half parafrontal width on entire length; cheek fully one-third eye height. Abdomen not so strongly compressed or pointed as in male, black with only a trace of red on sides near base, last three segments silvery on anterior half or less, discals on intermediate segments small, depressed but differentiated; genitalia retracted, terminating in a blunt-tipped larvipositor. Legs distinctly shorter and stouter than in male.

Holotype.—Male, El Paso, Texas, August 6, 1919. Allotype: female, Bexar County, Texas, June 8, 1928 (H. B. Parks). Paratypes: 1 male, same data as holotype; 1 male, Chiricahua Mountains, Arizona, July 4, 1940 (D. E. Hardy) in the Snow Entomological Collections; 3 males, "Cave Ck. Can., Ariz. Chiricahua Mts., July 4-8, 40 (D. G. Hall)" in the U.S. National Museum.

Minthozelia mira, n. sp.

Very similar to the preceding species, from which it differs, mainly in color pattern as follows:

Female.—Length 8.5. Abdomen wholly red, with pollen on segments two and three restricted to basal third above and less at sides, anal segment shiny, devoid of pollen except on ventral basal margin, discals on intermediate segments barely differentiated; vertex nearly one-third head width; frontal vitta deep brown, slightly over one-half parafrontal width; cheek almost two-fifths eye height; legs reddish black, tarsi darker.

Holotype.—Female, College Station, Texas, June 19, 1920 (H. J. Reinhard).

This specimen and the allotype female of the preceding species were determined as **M. montana** Townsend by the late Dr. J. M. Aldrich. Aside from their larger build, both species differ from the genotype in having four postsutural dorsocentrals. There appear to be no important structural differences between these forms and additional material may eventually prove **mira** a color phase falling within the specific limits of **argentosa**.

Minthozelia gracilis, n. sp.

Smaller and more slender in build than **argentosa**, from which it is at once distinguished by the red-tipped abdomen.

Male.—Length 7-9 mm. Frontal profile about three-fourths longer than facial; vertex just over one-fifth head width, the front gradually widened

forward; head silvery pollinose on dark ground color except cheek grooves which are reddish; frontal vitta velvety black, as wide as parafrontal on anterior extremity but narrowed to one-half width of same before triangle; latter with several pairs of small divergent hairs, with anterior pair at times moderately differentiated; antennae red, third segment tinged with fuscous, rather slender and about one-half longer than second; palpi red; cheek slightly exceeding one-fourth eye height.

Thorax and scutellum black, silvery white pollinose, notum marked with four indefinite dark vittae. Wings clear, veins yellow, calypters large, translucent, white. Legs black, elongate, weakly bristled.

Abdomen strongly compressed and narrowed apically, black the sides and apex reddish, with silvery pollen on basal half or more of last three segments; discals depressed but distinct, irregular at times, two to three pairs on intermediate segments and one or two on anal; genitalia retracted, forceps as mentioned in key; accessory process very slender from base to tip, nearly as long as forceps; fifth sternite wholly retracted.

Female.—Front at vertex three-tenths of head width, widening slightly towards antennae; outer verticals weak and less than half as long as inner pair; ocellars vestigial; third antennal segment broader and palpi more thickened than in male; cheek about one-third eye height; abdomen broader but not so pointed apically, wholly black with red apex, last three segments silvery on basal third to two-fifths; discals barely differentiated on intermediate segments and none on fourth; legs shorter, stouter, last segment of fore tarsi slightly widened.

Holotype.—Male, Cloudcroft, New Mexico, June 28, 1932 (R. H. Beamer), in the Snow Entomological Collections. Allotype: female, Culberson County, Texas, July 14, 1937 (C. E. Heard). Paratypes: 1 male, same data as allotype; 2 males, Las Cruces, New Mexico, July 3, 1940 (E. E. Kenaga), 3 males, same data as holotype and 1 male, Chiricahua Mountains, Arizona, July 4, 1940 (R. H. Beamer), all in the Snow Entomological Collections.

Minthozelia metalis, n. sp.

Grayer in general aspect and the abdomen more extensively pollinose than in any of the related forms.

Male.—Length 7-9.5 mm. Arcuate frontal profile about two-thirds longer than facial; front at vertex barely one-fifth head width, slightly wider to lower fourth thence diverging evenly in facial angle; head pollen gray with a light yellowish tinge on parafrontals near vertex; ocellar triangle beset with a series of three or four pairs of divergent hairs, anterior pair somewhat larger and slightly proclinate; antennae mostly red, third segment less than twice length of second; palpi red; cheek fully one-third eye height.

Thorax and scutellum black, densely gray pollinose, not distinctly vittate above. Wings hyaline, tinged with yellow on costal margin, veins brown; calypters transparent white, with a uniform tawny tinge. Legs black, long and rather slender, front tibia with one stoutish bristle near middle on outer hind side; front tarsus fully one-half longer than tibia.

Abdomen elongate, conical, black with sides and apex reddish, last three segments gray pollinose on anterior three-fifths or more above; two or three pairs of depressed discals on intermediate segments, sometimes irregularly spaced; genitalia reddish, forceps narrow, tapering evenly from base to tip; fifth sternite entirely concealed. Female unknown.

Holotype.—Male, Amherst, Ohio, July 8, 1922 (A. J. Barckert). Paratype: 1 male, Pineola, North Carolina, June 15, 1934 (J. A. Harris).

Minthozelia nitens, n. sp.

A shiny black and silvery fly with narrow abdominal fasciae in female, antennae blackish.

Female.—Length 8.5 mm. Frontal profile a trifle over one-half longer than facial; front at vertex about one-third head width, diverging gradually to antennal base; head silvery white pollinose; frontal vitta velvety black, at antennae subequal parafrontal width, narrowed towards vertex; ocellars small or hairlike; outer verticals small but distinct; one reclinate and two stout proclinate orbitals; third antennal segment mostly black, rather narrow at base but somewhat widened apically, twice longer than second; palpi red, slender; cheek one-third eye height.

Thorax and scutellum black, wholly silvery pollinose, notum marked with four changeable dark vittae which are defined only at certain favorable angles. Wings clear, veins brown; calypters opaque white. Legs black, moderately stout; apical segment of fore tarsus somewhat widened.

Abdomen moderately long and pointed, wholly black, last three segments silvery on basal third or less; discals at most barely differentiated on segments two and three, none on four; anal orifice narrow, genitalia retracted.

Male.—Length 6.5 mm. (one specimen). Vertex one-fifth head width; legs long and slender; abdomen strongly compressed and silvery fasciae distinctly wider than in female; discals differentiated on each of last three segments; genitalia retracted, forceps united, rather narrow, tapering from base to tip.

Holotype.—Female, Chiricahua Mountains, Arizona, July 4, 1940 (R. H. Beamer), in the Snow Entomological Collections. Allotype: male, Red River, New Mexico, 9000 ft., August 7, 1940 (F. Snyder). Paratypes: 1 female, same data as allotype except dated August 14, 1940; 2 females, Cave Ck. Can., Arizona, Chiricahua Mts., July 4-8, 40 (D. G. Hall) and Hot Springs, Arizona, June 26 (H. S. Barber) in the U.S. National Museum.

Minthozelia ruficauda, n. sp.

Female.—Length 9-10 mm. Frontal profile strongly arcuate, one-half longer than facial; front at vertex barely one-third head width, diverging downward in the facial angle; head silvery pollinose; frontal vitta deep brown to blackish, narrower than parafrontal except on anterior extremity; orbital bristles variable, two to four proclinate and one reclinate; outer verticals strong, about two-thirds as long as inner ones; ocellar triangle with row of four pairs of small divergent hairs, the anterior moderately differentiated and sometimes slightly proclinate; antennae red, somewhat darker

below arista, second segment elongate, over half as long as third; palpi red, slender; cheek nearly two-fifths eye height.

Thorax entirely silvery pollinose, with indefinite dark vittae above, scutellum black. Wings clear, veins yellow, third with two to five setulae at base; calypters opaque white. Legs black, femora moderately stout, gray pollinose; apical segment of fore tarsus slightly widened.

Abdomen moderately broad at base, compressed and pointed apically, shining black with orange red anal segment; latter without any pollen above but segments two and three silvery on narrow anterior edge; no discals; anal orifice slitlike, genitalia retracted. Male unknown.

Holotype.—Female, Forest Hills, L.I., New York, July 4, 1927. Paratype: 1 female, same data. Both specimens donated by Dr. Stanley W. Bromley.

Unidentified material: One teneral male specimen from Goldthwaite, Texas, collected by the late C. E. Heard, is apparently distinct from all the species identified above. It is too poorly preserved for description and inclusion here.

A NEW GENUS AND SPECIES OF NOTONECTIDAE

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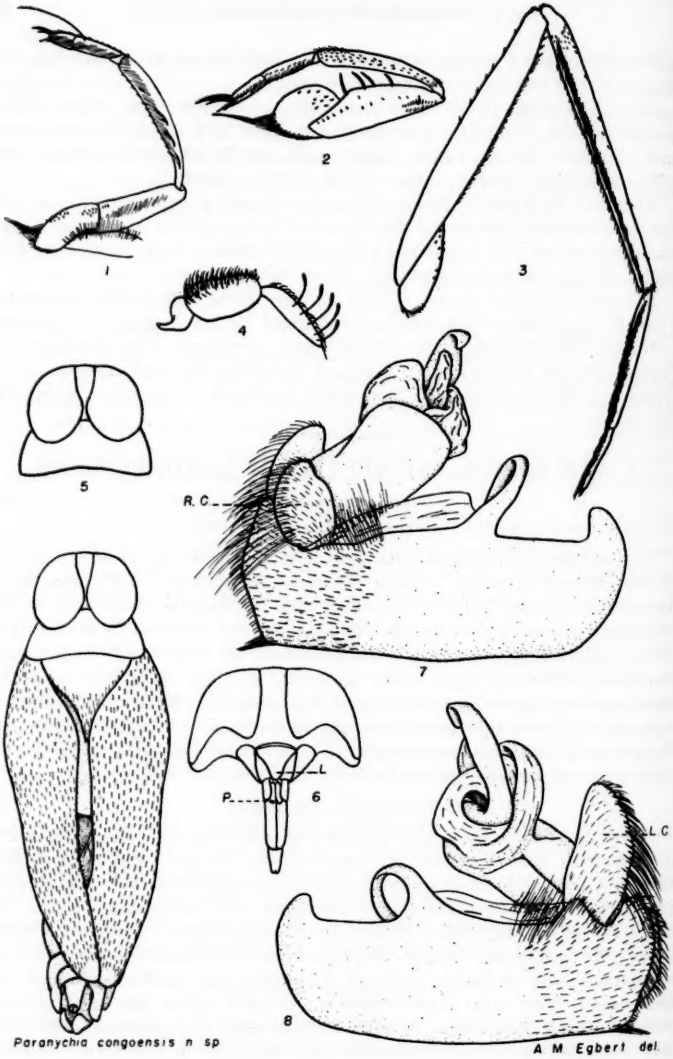
In a collection of Notonectidae from Africa, sent to me for determination by the Carnegie Museum, I find a long series of specimens that appear to be **Anisops tuberculata** Poisson but which lack the definite black lines on the vertex as figured by Poisson. In this lot there are 69 males, 74 females and 15 nymphs besides some 15 broken specimens, all from the French Congo. In addition there are eight adult specimens and four nymphs of a species that cannot be placed in any genus so far described. Moreover it possesses a mixture of characters which prevents its running to a tribe in my key to the genera of Notonectidae on page 9 of "The Genus Notonecta of the World" (University of Kansas Science Bulletin, XXI, No. 1).

Paranychia new genus

General facies a little like Nychia but more robust. The eyes nearly contiguous at base. The labrum triangular and flat as in Nychia and Martarega. Antennae three-segmented. The pronotum short, with lateral margins straight to slightly convex, divergent, and prothorax lacking the lateral fovea characteristic of Nychia and Martarega. Scutellum rather large. The hemelytra opaque, the hemelytral commissure lacking the pit so characteristic of the Anisopinae. The front and middle legs short and fairly stout, their tarsi three-segmented in both sexes, the basal segment minute. The middle femur without an anteapical protuberance. The hind legs long, their tarsi two-segmented. All tarsi end in two claws, those of hind tarsi inconspicuous. The infracoxal plates bare but margined with hair. The genital capsule of the male (ninth abdominal segment) cleft behind. The female gonapophyses short.

Genotype: **Paranychia congoensis.**

*Contribution from the Department of Entomology, University of Kansas.



1. Foreleg of **Paranychia congoensis.**
2. Middle leg of **Paranychia congoensis.**
3. Hind leg of **Paranychia congoensis.**
4. Antenna of **Paranychia congoensis.**
5. Head and prothorax of female.
6. Head and beak of male showing: L., the labrum; p., the two silvery protuberances on the second segment.
7. Male genital capsule from right side: R.C., right clasper.
8. Male genital capsule from left side: L.C., left clasper.
9. **Paranychia congoensis** male, dorsal view.

The following key will separate the genus Paranychia from other genera.

Key to genera of Notonectidae

A. Hemelytral commissure without definite hair-lined pit at anterior end ..... (Subf. **Notonectinae**)

B. Intermediate femur with anteapical pointed protuberance and antennae 4-segmented ..... (Tribe **Notonectini**)

C. Anterolateral margins of prothorax not foveate ..... **Notonecta**

CC. Anterolateral margins of prothorax foveate ..... **Enithares**

BB. Intermediate femur without anteapical pointed protuberance.

Antennae 3- or 4-segmented ..... (Tribe **Nychini**)

C. Intermediate tarsus with two well-developed segments and a very small basal one. Sides of prothorax not foveate. Infracoxal plates bare but margined with hair ..... **Paranychia**

CC. Intermediate tarsus with one well-developed segment. Sides of prothorax foveate. Infracoxal plates covered with hair.

D. Antennae 3-segmented ..... **Nychia**

DD. Antennae 4-segmented ..... **Martarega**

AA. Hemelytral commisure with definite hair-lined pit at anterior end ..... (Subf. **Anisopinae**)

B. Ventral abdominal keel not extending onto last abdominal segment. Male genital segment cleft behind. Males without stridular protuberance on front tibia. Females with short gonapophyses ..... **Paranisops**

BB. Ventral abdominal keel extending onto last abdominal segment. Male genital capsule closed behind. Males with stridulatory protuberance on front tibia. Females with long subspatulate gonapophyses.

C. Male with anterior tarsus 1-segmented ..... **Anisops**

CC. Male with anterior tarsus 2-segmented ..... **Buenoa**

Paranychia congoensis new species

Size: Length 5.46 mm. to 6.3 mm.; width of head 1.26 mm. to 1.51 mm.; greatest width across body 1.89 mm. to 2.1 mm.

Color: May be uniformly light brown with reddish brown vertex, or there may also be submarginal dark brown bands on the sides of the pronotum, some darker brown patches on the scutellum, along the costal margin and across the middle of the hemelytra which are opaque and covered with short appressed white hairs. Eyes, legs and venter light brown.

Structural characteristics: The eyes at synthlipsis nearly contiguous for a distance about one fifth the length of the vertex as seen from above; the interspace slightly wider in the female. Vertex with slight depression in front, face transversely depressed above the clypeus. The labrum triangu-

lar, its width at base greater than its length (5:3.6), the sides somewhat concave, its tip extending upon the base of the second segment of the beak. The beak short, its tip not reaching the base of the trochanter of the front legs when flexed; in the male the second segment has a pair of small, silvery protuberances on its anterior distal margin. The antennae three-segmented, first segment globose, second segment thickened, third segment slender with five long spatulate hairs and both second and third segments covered with short curved hairs. Length of antennal segments: 1st : 2nd : 3rd :: 10 : 32 : 37. The caudal width of pronotum three times its median length, the lateral margins divergent and slightly convex. The sides of the prothorax pruinose but not foveate. The scutellum wider than long (64:57). The hemelytra opaque, only the narrowed tip membranous; the hemelytral commissure longer than the scutellum (70:50), sometimes with faint depression where the pit would occur in Anisops; the costal margin with slight constriction beyond the middle. Hind wings aborted as in Nychia which may account for the reduced hemelytra. The legs as shown on Plate ●. The measurements of the front leg: femur : tibia : first and second tarsal : third tarsal :: 100 : 112.6 : 43.5 : 26.5. Middle leg : femur : tibia : first and second tarsal : third tarsal :: 100 : 88.9 : 47.9 : 28.5. In both middle and front legs the tarsal claws are unequal in length, the longer one as long as the third tarsal segment. Hind leg : femur : tibia : first tarsal : second tarsal :: 100 : 94.6 : 42.1 : 25.5. The male genital capsule as shown on Plate ●. The left clasper larger than the right.

Location of types: Described from 4 ♂♂, 4 ♀♀ bearing the label "Lake Onanga, Fr. Congo, A. C. Good, Holland Collection." Holotype ♂, allotype ♀ and two paratypes in Carnegie Museum; other paratypes in Francis Huntington Snow Collections, University of Kansas.

A NEW SPECIES OF EPITEDIA JORDAN (SIPHONAPTERA)*

E. W. JAMESON, JR.
Lawrence, Kans.

The known species of **Epitedia** Jordan fall into two groups. The species of the first group, which contains **wenmanni** (Rothschild), **testor** (Rothschild), **faceta** (Rothschild), and **stanfordi** Traub, have the tail of the receptaculum seminis of the female projecting clearly into the head, and have the immovable process of the male divided into two distinct lobes. The shape of the immovable process of **testor** is unknown, the male being undescribed. The species of the second group, in which belong **scapani** (Wagner) and **stewarti** Hubbard, do not have the tail of the receptaculum seminis projecting into the head, and have the immovable process undivided.

Professor R. H. Beamer and the author collected the specimens of the new species described below from the nests of woodrats, **Neotoma floridana osagenis** Blair.

* Contribution from the Museum of Natural History, University of Kansas.

Epitedia neotomae n. sp.

This new species resembles the species in the first group in the nature of the receptaculum seminis of the females, and the species of the second group in the shape of the immovable process of the male clasper. The male of the new species can be separated from the males of **scapani** and **stewarti** by the presence of one prominent bristle close to the apex of the immovable process in contrast to three bristles along the dorsal edge characteristic of **scapani** and **stewarti;** by the shape of the manubrium, it being straight in neotomae rather than curved as in **scapani** and **stewarti;** and by the shape of the distal arm of sternite IX, there being a bend in **neotomae** and no bend in **scapani** and **stewarti.** The female of **neotomae** can be distinguished from the females of the first group by the shape of tergum VIII, there being an acuminate lobe at the posterior lower angle in **neotomae.**

Male and Female Head. Frons with a small frontal tubercle which projects just beyond the margin of the head. Preantennal region with two rows of bristles, the first row of four or five moderate bristles, and the second row of four bristles, the second from the top being the same size as those of the first row, the remaining three being longer and heavier. A row of four minute setae between these two rows. Postantennal region with three rows of bristles. The first two rows each with six bristles, and the third row with nine or ten alternating large and small bristles. Dorsal border of the antennal groove with three to five fine hairs. The genal ctenidium of two spines, a shorter, wider one lying outside of a more slender, longer one which extends slightly beyond the genal process. The bristles of the second antennal segment short in the male, and extending halfway to the end of the antenna in the female. Labial palpus of five segments, extending almost to the full length of the forecoxae.

Thorax. Pronotal ctenidium of fourteen teeth, cephalad of which is a row of bristles of which are long and heavy, and four short and slender. Meso- and metanota each with three rows of bristles, the caudal being the heaviest.

Legs. The coxae with several rows of bristles or hairs on their cephalolateral borders. Profemorae with five to seven thin bristles on the mesal borders, mesofemorae with one, and metafemorae with none. Four pairs of heavy dorsolateral bristles on the pro, meso, and metatibiae. Tarsal segments heavily clothed with lighter bristles. Fore- and metatarsi with four pairs of lateral plantar bristles and basal ventral pair. Hind tarsi with four pairs of lateral plantar bristles.

Abdomen. First four terga each with a small spiniform on each side. Antepygidial bristles three, the central one longest, the inner half the length of the central one, the outer slightly longer than the middle one. Sterna III to VI in the male with four large and two or three small bristles. Sterna III to VI in the female with five large and four or five small bristles.

Modified Segments, Male. Eighth sternite with the caudal margin sloping upward, the apex rounded, and dorsal edge slightly convex. Sternite VIII

with three large and three or four small bristles. Process of the immovable clasper (P, Fig. 2) undivided with the apex rounded and the caudal margin with a slight convex curvature. Immovable process with one large and thirty to thirty-five small bristles. Distal arm of sternite IX (D.A., Fig. 2) with four heavy teeth at the caudal edge of the terminal end, and with a ventral cephalad row of five or six small teeth and bristles, decreasing in size ventrally. Manubrium long, slender, and straight with a slight constriction in the middle, and with the dorsal edge slightly concave. P enis slightly constricted near the middle, ending in a sharp curved point. Springs with a quarter turn.

Modified Segments. Male. Eighth sternite with the caudal margin sloping twice as long as broad, the tail projecting into the head for about one third the length of the latter. Projecting part of the tail shorter than the head. Tergum eight (T. VIII, Fig. 1) with a pronounced acuminate lobe at its lower, posterior angle. Sternite seven (St. VIII, Fig. 1) with eight to ten heavy bristles, and five to eight smaller bristles. Sternite VII with a sinus above and below a lobe located near the ventral margin. Bursa copulatrix heavily pigmented.

Type locality—Five miles north of Lawrence, Douglas County, Kansas.

Types—The holotype male and allotype female were collected from the nest of woodrats by Professor R. H. Beamer and E. W. Jameson, Jr., on October 10, 1945, five miles north of Lawrence, Douglas County, Kansas. The type specimens are deposited in the Snow Entomological Collections at the University of Kansas, Lawrence, Kansas.

Paratypes. Fifteen males and fifteen females collected from the above woodrat nests constitute the paratype series. One pair will be sent to each of the following institutions: United States National Museum, Washington, D.C.; Zoological Museum, Tring, Hertfordshire, England; Rocky Mountain Laboratory, Hamilton, Montana; United States Public Health Service Plague Investigation Station, San Francisco, California; Dominion Entomological Laboratory, Kamloops, British Columbia; and Cornell University, Ithaca, New York.

Additional Records. One male and two females collected at the type locality by J. F. Case from a spotted skunk, **Spilogale interrupta** (Rafinesque); and two males and two females collected by the author two miles south of Ellsworth, Ellsworth County, Kansas, from a woodrat, **Neotoma floridana osagensis** Blair.

The author is indebted to Mr. George P. Holland for assistance with the determination, and to Professors R. H. Beamer and D. S. Farner for critical assistance with the drawings and manuscript.

Explanation of Plate

Fig. 1. Modified segments of female, **Epitedia neotomae** new species.
Fig. 2. Modified segments of male, **Epitedia neotomae** new species.

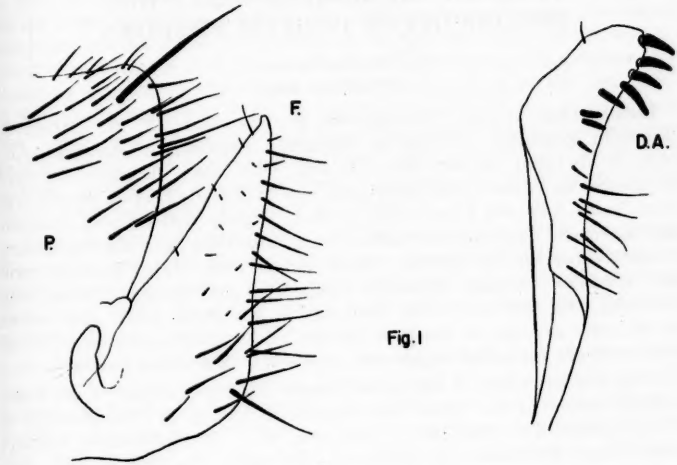


Fig. 1

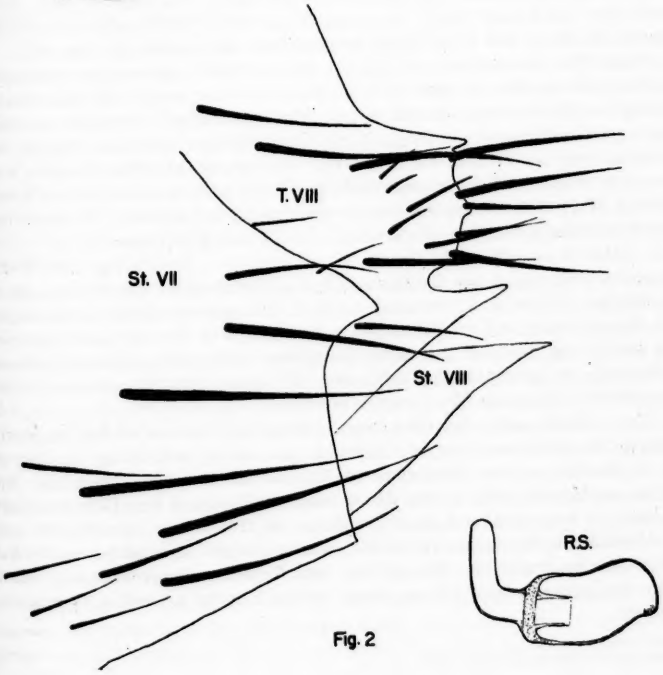


Fig. 2

NOTES ON THE JUNIPER MEALY BUG, PSEUDOCOCCUS JUNIPERI EHRHORN

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Yates Center, Kans.

Pseudococcus juniperi Ehrhorn was first named by E. M. Ehrhorn in 1906 from specimens collected on **Juniperus virginiana** at Ashforks, Arizona. In his paper, "A Few New Coccidae, with Notes," Ehrhorn described the species as follows (full description not included): "Adult female oval, about 2 mm. long and 1 mm. broad, convex, slightly covered with secretion. Egg-sac small. Young larvae reddish. Derm colourless, with numerous short, straight spines on the dorsum. Adult female when boiled in KOH turns dark crimson. Antennae 8-jointed. Legs long and slender. Caudal lobes rounding, with one very long, stout bristle and three short, stout spines on the outer and one on the inner margin. Each lobe has numerous round gland orifices. Anal ring large, oval, ———, with six long hairs———."

With the exception of the above description, no mention of the insect could be found by the writer until reports of damage to yard plantings at Pratt, Kansas, were observed in the notes of J. O. Nottingham. assistant entomologist, Entomological Commission of Kansas, for July 9, 1941. Surveys were conducted during the summer of 1941 by Nottingham and Louis Kuitert in Pratt and Great Bend to determine the extent of infestation.

From the records kept by Doctor Reece Sailer, assistant entomologist during the summer of 1942, it is evident that the insect had been doing damage at Greensburg, Haviland, and Medicine Lodge. Complete surveys were made of Haviland, Greensburg, Winfield, and Hillsboro during the summer and fall of 1943 by the writer. On March 18, 1944, the pest was found in Wichita where it apparently had been present for a year or more. During May, 1945, a complete survey was conducted at Pratt. In surveying the surrounding territory the mealy bug was found at Coats.

A letter from Clyde A. Bower, chief inspector, Entomology and Plant Industry Division of the Oklahoma State Department of Agriculture, dated September 5, 1944, and addressed to H. B. Hungerford, State Entomologist for the southern half of Kansas, says in part: "For the past several years the mealy bug has been increasing in number on juniper in yard plantings, principally in northwestern Oklahoma. We have found it quite serious in a number of lawns in Woodward, Oklahoma."

The juniper mealy bug was found during the summer of 1942 approximately 20 miles southeast of Coldwater on native wild cedar by Doctor R. H. Beamer of the University of Kansas. It was again found by the writer on May 16, 1944, on the Shaw ranch southeast of Sun City on cedars growing in a canyon, and again on March 30, 1945, along highway 160 west of Medicine Lodge on native cedar. Cedars found infested on residential properties at Protection, Greensburg, and Medicine Lodge had been taken from the canyon country in southern Barber County, according to property owners.

*Assistant to State Entomologist.

The juniper mealy bug usually first attacks the lower and inner branches of the trees, working toward the top and outward, although occasionally one side or perhaps a spot anywhere on the tree may bear the brunt of the infestation. Sapping of the tree leads first to browning of the foliage, followed by dropping of the leaves, with a denuded tree as the end result. A three-year attempt at Pratt to encourage a stripped tree to send forth new foliage was abandoned when the same barren appearance persisted. In most cases multiplication of the pest leads to severe injury or death of small trees within ten days to three weeks after the attack is recognized, unless immediate steps are taken to combat it.

From an economic standpoint, in the opinion of this writer, the greater damage to ornamental plantings is not from the killing of the junipers but rather from partial injury which ruins the trees for landscaping purposes. This would make the mealy bug a great potential danger to the many nurseries raising juniper varieties for sale.

In addition to the native red cedar, **Juniperus virginiana**, the mealy bug has been observed by the writer attacking the following: **Juniperus virginiana** var. **cannarti**, var. **glauca**, var. **burki**, and var. **pyramidiformis**; **Juniperus communis** var. **hibernica** and var. **depressa**; **Juniperus horizontalis**, var. **douglasii** and var. **plumosa**; **Juniperus scopularum**; **Juniperus sabina**, and var. **von ehron.**

This insect is interesting at this time because, so far as is known, no study has been made of its life history and very little study of its control. Doctor Harold Morrison, Bureau of Entomology and Plant Quarantine, Division of Insect Identification, said in a letter in 1942 to Professor George A. Dean, then state entomologist, Manhattan, that "apparently this insect is of little importance because we have only one previous record of it in our files and we have been unable to find any reference in literature concerning injury caused by it or recommendations for its control."[2] Apparently the one record mentioned by Morrison was the original description by Ehrhorn in 1906.

Because of work demands which have made it impossible for the writer to remain for sufficient time in localities infested by the mealy bug, little has been done by him toward rearing the insect. Field observations have resulted in finding the insect in egg, nymphal, and adult stages during the winter as well as in the summer months. The low ebb in the occurrence of the pest appears to be in the period following the spring rains of late March, April, and early May. A large percentage of the adult population seems to be adversely affected by the cold weather of late December and January, but eggs and nymphs carry over all winter, with hatching apparently continuing throughout the year. A heavier egg-sac appeared to be present in the infestation at Great Bend during February, 1946, and all adults were found dead. At Wichita, during the survey made also in February, 1946, the egg-sac looked much lighter and live adults were plentiful.

No killing of trees in the wild by this insect has been discovered. This may be due to the fact that the juniper mealy bug may be held in check by predators and parasites. At any rate only branches of those trees have

been killed. With the exceptions of infestations at Winfield and Great Bend, varying degrees of control by natural enemies of the insect were observed in urban infestations. In no case was the control sufficient to halt the spread of the pest or to prevent severe damage to the trees.

During November, 1945, mealy bugs from infested trees at Pratt and Coldwater were examined and very small chalcid wasps were taken from the bodies of adults. These, though immature and in poor condition, were sent to Washington, D.C., where they were tentatively identified by A. B. Gahan of the National Museum. Another series of specimens, reared from material collected on February 4, 1946, and emerging on March 3, 1946, were sent to Mr. Gahan who identified the parasites as follows: **Anagyrus** n. sp., **Tetrastichus minutus** How., and **Pachyneuron altiscuta** How. At least one species of mite and larvae of a Coccinellid beetle have been observed preying upon the mealy bug.

Two species of ants, not yet identified, have been observed feeding on the "honeydew" or exudate of the mealy bug. One ant is very small and black and the other is a larger species, with red thorax and black abdomen. Flies are attracted to the infested trees in large numbers and serve as a means of recognizing possible infestations. What part the ants and flies play in the transmission of the mealy bug from tree to tree is not known although the writer captured several ants carrying nymphs of the insect down an infested tree after the tree had been sprayed.

The first record the writer has of chemical control of the juniper mealy bug was taken from the notebook of Doctor Sailer in which he mentions a nicotine sulphate spray being used at Pratt in 1941. Doctor Sailer experimented with various combinations of materials during the summer of 1942, finally noting that a nicotine sulphate-soap solution gave the best results. The junipers were also banded with some sticky substance which prevented ants from running up and down the trees. He also observed that more than two sprays at short intervals were required to clean out an infestation.

During the past three years the writer has observed that in some cases as many as four and five sprays have been applied at intervals of from four to ten days with re-infestation occurring in a few weeks' time. Also, in one instance, an isolated infestation reappeared after a year of apparent freedom from the pest following a two-summer spray program.

In the summer of 1945 the writer made preliminary experiments with DDT in several combinations at Pratt. A water suspension of DDT with nicotine sulphate appeared most promising. Using a 50% DDT wettable powder at 5% strength by weight, and adding 3 teaspoons of Black Leaf 40 per gallon of material, the kill was apparently a hundred per cent when an examination was made two weeks after the spray was applied to one heavily infested tree. An examination of another tree nearly two months after it had been sprayed with 5% DDT in a colloidal clay suspension with a small amount of a wetting agent added, revealed no live mealy bugs, flies nor ants. At the same time a check tree approximately 20 feet away remained heavily infested, with ants and flies abundant. Materials were

applied with a three-gallon compressed air sprayer. It is hoped that more extensive work with DDT during the summer of 1946, using power sprayers, will bring about satisfactory results with a lower concentration of DDT.

Summary

(1) The juniper mealy bug, **Pseudococcus juniperi** Ehrhorn, apparently is a little-known insect which has become a menace to ornamental juniper plantings in Kansas and in some sections of Oklahoma. (2) It has been found infesting native cedar trees. Some work with DDT has been done and the results appear promising.

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A NEW PHYLLOPHAGA FROM TEXAS (COLEOPTERA, SCARABAEDAE)[1]

H. J. REINHARD
College Station, Texas

The present new species comes from southwestern Texas and has been awaiting description for several years.

Phyllophaga zavalana, n. sp.

Similar to **P. cribrosa** in general aspect but smaller and more compact in build; the elytra are less distinctly costate and there are genitalic differences.

Male.—Apterous, ovate, gibbous, wholly black, surface above glabrous. Clypeus coarsely, densely punctuate, margin moderately reflexed with apex shallowly emarginate and lateral angles broadly rounded; suture slightly impressed, sinuate. Front flat, punctures close but slightly coarser and deeper than on clypeus. Antenna 10-segmented, shiny nigrorufescent, club ovate, considerably shorter than funicle. Thorax with margin coarsely crenate in front of lateral dilation and more finely so behind, basal angles subrectangular, front angles acute but rounded; disc flattened and declivous at middle on anterior three-fifths or more, densely and coarsely punctate except immediately behind flattened middle area and usually one or more smaller impunctate areas nearer lateral margin, punctures well impressed, surface within each reticulate and bearing a minute recumbent pale hair, mesosternum polished, with a very sparse vestiture of pale yellowish hairs, each of which arises from a well impressed moderately large puncture; scutellum transverse, shiny, smooth or at most with a few scattered fine punctures. Legs shining black; front tibiae tridentate, tarsi with a blunt-tipped tooth at inner apex of segments one to three; hind tarsi subequal length of tibiae; all claws bearing a long acute tooth well before middle;

[1] Contribution No. 951, Division of Entomology, Texas Agricultural Experiment Station.

spurs of hind tibiae free, moderately long and slender. Elytra with basal margin slightly reflexed, humeri depressed, sutural and submarginal costae moderately defined and disc with four rather vague oblique costae which become evanescent toward base and apex, intervals with irregularly placed, fine, setiferous punctures. Abdomen moderately impressed at middle, very sparsely and finely punctured, the sides more coarsely so with longer recumbent hairs; fifth segment transversely impressed before hind margin, the following one very short; pygidium wider than long, glabrous, subshiny, disc gently convex with rather coarse shallow sparse punctures, margin narrowly reflexed, ciliate on apical third.

Female.—Similar to male except as follows: Antennal club shorter, slightly over one-half length of funicle; abdomen less flattened at middle, sixth segment coarsely punctate, its median length about one-half the preceding segment; pygidium longer, more narrowed apically, disc nearly flat, impunctate on median line; hind tarsi slightly shorter than tibiae, spurs of latter a trifle shorter but considerably broader in male.

Length, 17-20 mm. Width, 9.5-12 mm.

Holotype male and allotype female, Zavala County, Texas, October 24, 1941 (S. E. Jones) in the Texas Agricultural Experiment Station Collection.

Paratypes: 107 males and 96 females, Zavala and Dimmit Counties, Texas, April to October, 1933-41 (S. E. Jones, M. J. Janes and W. H. Ewart).

In relationship the present species appears intermediate between **cribrosa** and **renodis**; it has the habitus of the former but genitalia about as illustrated for the latter, q.v. (Jour. Kans. Ent. Soc., 12, 1939, 62.).

The following key will assist in separating the three species:

1. Scutellum entirely impunctate or with very minute scattered punctures; pronotum flattened at middle of disc and declivous on anterior half or more; male genitalia with inner margin of joined parameres evenly rounded or ring-like in posterior view ..... 2.

   Scutellum always coarsely and usually densely punctate; pronotum not conspicuously flattened at middle of disc; elytra distinctly costate; male genitalia with inner margin of joined parameres bearing a small but distinct tooth on each side basad of beak ..... **cribrosa** Leconte.

2. Elytra costate, striae oblique with fine punctures irregularly placed in more or less definite rows; pronotum densely and rather coarsely punctate, usually with an impunctate area at middle and sometimes with smaller ones on lateral margin of disc; sutural striae wide, not well impressed behind middle ..... **zavalana**, n. sp.

   Elytra smooth, without obvious striae, puncturation sparse, fine and rather uniformly spaced; pronotum sparsely punctate, surface between punctures smooth on middle half of disc; sutural striae narrow, well defined on entire length ..... **renodis** Reinhard.

GRASSHOPPERS EATEN BY UTAH BIRDS

GEORGE F. KNOWLTON[1]
Logan, Utah

Grasshoppers cause injury to Utah crops every year. During a series of years, grasshopper populations have been reduced through natural and artificial control over a number of counties, only to reappear in destructive abundance. Grasshopper baiting operations have been conducted in Utah since about 1936 as a cooperative federal-state-county program. According to county and state estimates such control programs have saved crops valued in excess of $7,000,000. The value of natural enemies in grasshopper control has appeared to the writer to be important, owing to the numbers and habits of the vertebrate and invertebrate predators, insect parasites and diseases present in Utah.

The following data are presented to indicate the extent to which birds had recently fed on grasshoppers, so far as the data were available from studies conducted since 1932.[2] Eastern sparrow hawks and Swainson hawks commonly are abundant in many parts of Utah and consume enormous numbers of grasshoppers each season, especially in localities where such pests are present in outbreak abundance. Individual western redtail hawks consume large numbers of grasshoppers, but these birds are less abundant in agricultural areas of Utah than the sparrow hawks and Swainson hawks.

During the fall migration when birds travel in large flocks, and in summer in areas where birds are abundant which consume appreciable numbers of insects the size of grasshopper adults and nymphs, birds doubtless are of importance in the down-grading of grasshopper populations. Approximately seventy-five per cent of the birds represented in the table were taken in range areas. Many such collections were made near enough to cultivated districts for the birds to spend part of their feeding time on farms and in cultivated fields.

Table 1. Grasshoppers contained in stomachs of birds collected in Utah, 1932 to 1945, inclusive.

Bird	Grasshoppers in stomachs	Stomachs Containing	Stomachs Total
Snowy egret	12	1	1
American bittern	1	1	1
White-eyed glossy ibis	13	2	3
Western red-tail hawk	415	8	12
Northern red-shouldered hawk	5	1	1
Swainson hawk	1068	15	23
Eastern sparrow hawk	2897	236	256
Sage hen	63	11	17
California quail	2	2	7

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[2] The writer is indebted to J. S. Stanford, C. F. Smith, F. C. Harmston, W. P. Nye, H. F. Thornley, P. E. Telford, T. O. Thatcher, D. R. Maddock, S. L. Wood and other associates and assistants who have cooperated in collecting birds, or saving bird stomachs, included in this summarization.

Bird	Grasshoppers in stomachs	Stomachs Containing	Total
Ring-necked pheasant	46	13	14
Killdeer	11	5	13
Long-billed curlew	18	3	3
Western willet	1	1	1
Avocet	2	2	2
Western mourning dove	3	3	31
Road-runner	3	1	1
Burrowing owl	42	5	6
Long-eared owl	1	1	1
Nuttall poorwill	1	1	2
Night hawk	9	1	6
Red-shafted flicker	1	1	16
Lewis woodpecker	3	3	6
Eastern kingbird	29	14	22
Arkansas kingbird	200	89	112
Say phoebe	34	21	28
Western wood peewee	3	3	3
Great Salt Lake horned lark	118	78	206
Barn swallow	1	1	62
American magpie	37	10	26
American raven	63	8	9
Desert Bewick wren	2	1	1
Rock wren	92	53	97
Western mockingbird	10	3	3
Catbird	5	2	3
Sage thrasher	246	95	113
Audubon hermit thrush	2	2	7
Western robin	14	7	30
Mountain bluebird	149	77	194
American pipit	1	1	102
White-rumped shrike	191	64	71
Western meadowlark	488	133	208
Yellow-headed blackbird	7	5	15
Thick-billed red-winged blackbird	62	27	103
Brewer blackbird	157	61	159
Bullock oriole	11	8	12
Lazuli bunting	3	1	3
English sparrow	7	3	33
Spurred towhee	3	1	2
Nevada Savannah sparrow	1	1	14
Western vesper sparrow	109	56	116
Western lark sparrow	221	113	130
Northern sage sparrow	21	14	46
Shufeldt junco	1	1	43
Western chipping sparrow	46	41	309
Oregon white-crowned sparrow	4	4	17
Gambel sparrow	69	29	133
Total	7024	1344	2855

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